

[0030]

After the outliers have been identified, a robust estimate of the mean (\bar{x}_{robust}) and a standard deviation (s_{robust}) for the set of n data samples $X \in \{x_1, x_2, \dots, x_n\}$ are calculated at steps 64 and 66. In essence, this determines how far the outliers deviate from the remainder of the data and thus represents the severity of the abnormal utility consumption denoted by each outlier. The process for making this determination commences with the set of outliers X_{out} and the set ($X_{non-out}$) of the data samples from set X that are not outliers. Specifically:

$$x_{non-out} = \{x | x \in X \text{ and } x \notin X_{out}\} \quad (11)$$

In the Claims:

Please amend claims 1, 9, 10, 12-15 and 17 as follows:

1. (Once Amended) A method for determining abnormal consumption of a utility by a system:
repeatedly measuring a level of use of the utility thereby producing a plurality of utility measurements;
employing a statistical procedure to identify any outliers in the plurality of utility measurements; and
evaluating performance of the system in response to any outliers identified.

9. (Once Amended) The method as recited in claim 8 wherein the Generalized Extreme Studentized Deviate (GESD) statistical procedure comprises:
(a) calculating an arithmetic mean (\bar{x}) of the plurality of utility measurements;
(b) finding an extreme utility measurement $x_{e,i}$ which is the utility measurement that has a value which is farther numerically from the arithmetic mean (\bar{x}) than the other ones of the plurality of utility measurements;
(c) using the extreme utility measurement $x_{e,i}$ to calculate an extreme studentized deviate R_i ;
(d) calculating a 100α percent critical value λ_i for the extreme utility measurement $x_{e,i}$; and

(e) declaring the extreme utility measurement $x_{e,i}$ to be an outlier when the extreme studentized deviate R_i is greater than the 100α percent critical value λ_i .

10. (Once Amended) The method as recited in claim 9 wherein the Generalized Extreme Studentized Deviate (GESD) statistical procedure further comprises:
removing the extreme utility measurement $x_{e,i}$ from the plurality of utility measurements to form a new plurality of utility measurements; and
repeating steps (a) through (e) for the new plurality of utility measurements.

12. (Once Amended) The method as recited in claim 9 wherein the 100α percent critical value λ_i is calculated using the equation:

$$\lambda_i = \frac{(n-i)t_{n-i-1,p}}{\sqrt{(n-i+1)(n-i-1+t_{n-i-1,p}^2)}}$$

where n is the number of utility measurements, i is a number identifying a particular outlier being evaluated, $t_{n-i-1,p}$ is a student's t-distribution with $(n-i-1)$ degrees of freedom, and p is a value based on a user defined probability of α of incorrectly declaring one or more outliers when no outliers exist.

13. (Once Amended) The method as recited in claim 12 wherein the percentile p is determined from:

$$p = 1 - \left(\frac{\alpha}{2(n-i+1)} \right).$$

14. (Once Amended) A method for determining abnormal consumption of a utility by a system, comprising:

- (a) repeatedly measuring a level of use of the utility, thereby producing a plurality of utility measurements;
- (b) forming a group of those of the plurality of utility measurements taken during predefined periods of time;
- (c) calculating an arithmetic mean (\bar{x}) of the group;
- (d) finding an extreme utility measurement $x_{e,i}$ which is the utility measurement having a value that is farthest numerically from the arithmetic mean (\bar{x});